CLAMS

1. A mask generation process for use in encoding audio data, including:

generating linear masking components from said audio data;

generating logarithmic masking components from said linear masking components; and

generating a global masking threshold from the logarithmic masking components.

2. The mask generation process as claimed in claim 1 wherein said step of generating linear masking components includes:

generating linear components in a frequency domain from said audio data;

selecting a first subset of said linear components as linear tonal components; and

selecting a second subset of said linear components as linear non-tonal components.

3. The mask generation process as claimed in claim 2, including generating sound pressure levels from said linear components using a second-order Taylor expansion of a logarithmic function.

4. The mask generation process as claimed in claim 3, including generating a normalized value corresponding to an argument of said logarithmic function, and using said normalized value in said Taylor expansion.

5. The mask generation process as claimed in claim 4, including:

generating said normalized value x for said argument Ipt, according to:

$$Ipt = (1-x)2^m,\ 0.5 < 1-x \leq 1$$

and using a second order Taylor expansion of the form

$$\ln(1-x) \approx x - x^2/2$$

to approximate said logarithmic function as:

$$\log_{10}(Ipt) \approx \left[m * \ln(2) - \left(x + x^2/2\right)\right] * \log_{10}(e)$$

6. The mask generation process as claimed in claim 2 wherein said step of generating a global masking threshold includes:

decimating said linear tonal components and said linear non-tonal components; and

generating masking thresholds from the decimated linear tonal components and the decimated linear non-tonal components.

7. The mask generation process as claimed in claim 6, wherein said step of generating a global masking threshold includes determining maximum components of said masking thresholds and predetermined threshold values.

8. The mask generation process as claimed in claim 7 wherein said global masking threshold is generated according to:

$$LT_g(i) = \max\left[LT_q(i) + \max_{j=1}^{m}\{LT_{tonal}[z(j), z(i)]\} + \max_{j=1}^{n}\{LT_{noise}[z(j), z(i)]\}\right]$$

where i and j are indices of logarithmic power components, $z(i)$ is a Bark scale value for logarithmic power component i, $LT_{tonal}[z(j), z(i)]$ is a tonal masking threshold for logarithmic power components i and j, $LT_{noise}[z(j), z(i)]$ is a non-tonal masking threshold for logarithmic power components i and j, m is the number of tonal logarithmic power components, and n is the number of non-tonal logarithmic power components.

9. The mask generation process as claimed in claim 1 wherein said logarithmic masking components are generated using a second-order Taylor expansion of a logarithmic function.

10. The mask generation process as claimed in claim 1, including generating masking thresholds from said logarithmic masking components using a masking function of the form:

$$vf = -17 * dz,\ 0 \le dz < 8.$$

11. The mask generation process as claimed in claim 1 wherein said linear masking components include linear energy components, and said logarithmic masking components include logarithmic power components.

12. The mask generation process as claimed in claim 1 wherein said process is an MPEG-1 layer 2 audio encoding process.

13. A mask generation process for use in encoding audio data, including:

generating logarithmic masking components; and

generating respective masking thresholds from the logarithmic masking components using a masking function of the form:

$$vf = -17 * dz,\ 0 \le dz < 8.$$

14. A mask generation process for use in encoding audio data, including:

generating logarithmic masking components; and

generating a global masking threshold from the logarithmic masking components according to:

$$LT_g(i) = \max\left[LT_q(i) + \max_{j=1}^{m}\{LT_{tonal}[z(j), z(i)]\} + \max_{j=1}^{n}\{LT_{noise}[z(j), z(i)]\}\right]$$

where i and j are indices of spectral audio data, $z(i)$ is a Bark scale value for spectral line i, $LT_{tonal}[z(j), z(i)]$ is a tonal masking threshold for lines i and j, $LT_{noise}[z(j), z(i)]$ is a non-tonal masking threshold for lines i and j, m is the number of tonal spectral lines, and n is the number of non-tonal spectral lines.

15. A mask generator for use in encoding audio data, comprising:

means for generating logarithmic masking components; and

means for generating respective masking thresholds from the logarithmic masking components using a masking function of the form:

$$vf = -17 * dz,\ 0 \leq dz < 8.$$

16. An audio encoder, comprising:

means for generating linear masking components from said audio data;

means for generating logarithmic masking components from said linear masking components; and

means for generating a global masking threshold from the logarithmic masking components.

17. A computer readable storage medium having stored thereon program code that, when loaded into a computer, causes the computer to execute steps comprising:

generating linear masking components from said audio data;

generating logarithmic masking components from said linear masking components; and

generating a global masking threshold from the logarithmic masking components.

18. A mask generator for an audio encoder, said mask generator comprising:

means for generating linear masking components from input audio data;

means for generating logarithmic masking components from said linear masking components; and

means for generating a global masking threshold from the logarithmic masking components.

19. A psychoacoustic masking process for use in an audio encoder, comprising:

generating energy values from Fourier transformed audio data;

determining sound pressure level values from said energy values;

selecting tonal and non-tonal masking components on the basis of said energy values;

generating power values from said energy values;

generating masking thresholds on the basis of said masking components and said power values; and

generating signal to mask ratios for a quantizier on the basis of said sound pressure level values and said masking thresholds.

20. An MPEG-1-L2 encoder, comprising:

means for generating energy values from Fourier transformed audio data;

means for determining sound pressure level values from said energy values;

means for selecting tonal and non-tonal masking components on the basis of said energy values;

means for generating power values from said energy values;

means for generating masking thresholds on the basis of said masking components and said power values; and

means for generating signal to mask ratios for a quantizier on the basis of said sound pressure level values and said masking thresholds.